Boundary Structure of Hyperbolic 3-Manifolds Admitting Annular and Toroidal Fillings at Large Distance

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Abstract. For a hyperbolic 3-manifold $M$ with a torus boundary component, all but finitely many Dehn fillings yield hyperbolic 3-manifolds. In this paper, we will focus on the situation where $M$ has two exceptional Dehn fillings: an annular filling and a toroidal filling. For such a situation, Gordon gave an upper bound of 5 for the distance between such slopes. Furthermore, the distance 4 is realized only by two specific manifolds, and 5 is realized by a single manifold. These manifolds all have a union of two tori as their boundaries. Also, there is a manifold with three tori as its boundary which realizes the distance 3. We show that if the distance is 3 then the boundary of the manifold consists of at most three tori.